

5     Claims

Sub  
Pt. 1

1     An apparatus for tracking signals comprising:

2     a first tracker for tracking a first component of a first  
3     signal and for generating a first estimate signal from a second  
4     component of the first signal;

5     a second tracker for tracking a first component of a second  
6     signal according to the first estimate signal; and

7     the second component of the first signal has the same  
8     pattern as the first component of the second signal.

9     2. An apparatus according to claim 1, wherein the pattern  
10    comprises:

11    a known pattern combined with an unknown pattern.

12    3. An apparatus according to claim 2, wherein timing information  
13    about the unknown pattern is known.

Sub  
Pt. 2

14    4. An apparatus according to claim 3, wherein:

15    the first tracker generates a timing signal in accordance  
16    with the timing information for improving the accuracy of the  
17    first estimate signal.

18    5. An apparatus according to claim 2, wherein:

19    the first tracker generates a first local component signal  
20    in accordance with the known pattern and combines the local  
21    component signal with a version of the first signal to generate  
22    the first estimate signal.

23    6. An apparatus according to claim 2, wherein:

24    the second tracker generates a second local component signal  
25    in accordance with the known pattern and combines the second  
26    local component signal with at least one version of the second  
27    signal to generate at least one second estimate signal.

5 7. An apparatus according to claim 6, wherein:

the second tracker generates a timing signal in accordance with the timing information for improving the accuracy of the at least one second estimate signal.

10 8. An apparatus according to claim 5, wherein:

the second tracker combines the first estimate signal with the at least one second estimate signal to provide a tracking signal for tracking the first component of the second signal.

15 9. An apparatus according to claim 8, wherein:

the second tracker combines the first estimate signal with the at least one second estimate signal to generate a combined estimate signal.

20 10. An apparatus according to claim 9, wherein:

the second tracker combines the first estimate signal with the at least one second estimate signal when the second tracker has not locked to the first component of the second signal; and

the second tracker combines the combined estimate signal with the at least one second estimate signal when the second tracker has locked to the first component of the second signal.

25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100 105 110 115 120 125 130 135 140 145 150 155 160 165 170 175 180 185 190 195 200 205 210 215 220 225 230 235 240 245 250 255 260 265 270 275 280 285 290 295 300 305 310 315 320 325 330 335 340 345 350 355 360 365 370 375 380 385 390 395 400 405 410 415 420 425 430 435 440 445 450 455 460 465 470 475 480 485 490 495 500 505 510 515 520 525 530 535 540 545 550 555 560 565 570 575 580 585 590 595 600 605 610 615 620 625 630 635 640 645 650 655 660 665 670 675 680 685 690 695 700 705 710 715 720 725 730 735 740 745 750 755 760 765 770 775 780 785 790 795 800 805 810 815 820 825 830 835 840 845 850 855 860 865 870 875 880 885 890 895 900 905 910 915 920 925 930 935 940 945 950 955 960 965 970 975 980 985 990 995 1000 1005 1010 1015 1020 1025 1030 1035 1040 1045 1050 1055 1060 1065 1070 1075 1080 1085 1090 1095 1100 1105 1110 1115 1120 1125 1130 1135 1140 1145 1150 1155 1160 1165 1170 1175 1180 1185 1190 1195 1200 1205 1210 1215 1220 1225 1230 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5 aligning a local version of a second component of the first  
signal with the first component of the first signal;

aligning a local version of a first component of a second  
signal with the first component of the first signal;

10 generating a first estimate signal from a version of the  
first signal and the local version of the second component;

applying the first estimate signal for locking to a first  
component of the second signal; and

wherein the second component of the first signal and the  
first component of the second signal comprise the same pattern.

15 13. A method for tracking signals comprising the steps of:

locking to a first component of a first signal;

aligning a local version of a second component of the first  
signal with the first component of the first signal;

aligning a local version of a first component of a second  
signal with the first component of the first signal;

generating a first estimate signal from a version of the  
first signal and the local version of the second component;

25 generating a second estimate signal from a version of the  
second signal and a local version of the first component of the  
second signal;

combining the second estimate signal and the first estimate  
signal to generate a combined estimate signal; and

30 selectively applying either the first estimate signal or the  
combined estimate signal for locking to a first component of the  
second signal; and

wherein the second component of the first signal and the  
first component of the second signal comprise the same pattern.

35 14. The method of claim 13, wherein the step of selectively  
applying further comprises the steps of:

selecting the first estimate signal for application if the  
local version of the first component of the second component has  
not been locked; and

5 selecting the combined estimate signal for application if  
the local version of the first component of the second component  
has been locked.

10 15. A method of semi-codeless tracking for a GPS receiver  
comprising the steps of:

receiving a GPS L1 signal and generating at least a  
quadrature baseband version of the GPS L1 signal;

receiving a GPS L2 signal and generating baseband versions  
of the GPS L2 signal;

15 multiplying the quadrature baseband version of the GPS L1  
signal with a locally generated version of a P-code used to  
generate the Y-code component of both the GPS L1 and L2 signals  
to generate a first estimate signal related to the W-code used  
with the P-code to generate the Y-code component;

20 multiplying the in-phase baseband version of the GPS L2  
signal with a locally generated version of the P-code to generate  
a second estimate signal related to the W-code used with the P-  
code to generate the Y-code component;

25 adding the first W-code estimate signal to the second W-code  
estimate signal to generate a combined W-code estimate signal;

30 applying the first W-code estimate signal to generate  
tracking signals for tracking when the GPS receiver has not  
locked to the GPS L2 signal; and

applying the second W-code estimate signal to generate  
tracking signals for tracking when the GPS receiver has locked  
to the GPS L2 signal.

16. A method of semi-codeless tracking for a GPS receiver  
comprising the steps of:

35 receiving a GPS L1 signal and generating at least a  
quadrature baseband version of the GPS L1 signal;

receiving a GPS L2 signal and generating baseband versions  
of the GPS L2 signal;

40 multiplying the quadrature baseband version of the GPS L1  
signal with a locally generated version of a P-code used to  
generate the Y-code component of both the GPS L1 and L2 signals

5 to generate a first wide-band estimate signal related to the W-code used with the P-code to generate the Y-code component;

integrating the first wide-band estimate signal based on known timing information of the Y-code to generate a first narrow-band W-code estimate signal;

10 multiplying the in-phase baseband version of the GPS L2 signal with a locally generated version of the P-code to generate a second wide-band estimate signal related to the W-code used with the P-code to generate the Y-code component;

15 integrating the second wide-band estimate signal based on known timing information of the Y-code to generate a second narrow-band W-code estimate signal;

adding the first narrow-band W-code estimate signal to the second narrow-band W-code estimate signal to generate a combined W-code estimate signal;

20 applying the first narrow-band W-code estimate signal to generate tracking signals for tracking when the GPS receiver has not locked to the GPS L2 signal; and

25 applying the second narrow-band W-code estimate signal to generate tracking signals for tracking when the GPS receiver has locked to the GPS L2 signal.